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JFW**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant(s): HOOPMAN et al. Group Art Unit: 1722  
 Appl No.: 09/520,032 Examiner: Joseph S. Del Sole  
 Confirmation No.: 9385  
 Filed: 6 March 2000 Docket No.: 49933US031

Title: TOOLS TO MANUFACTURE ABRASIVE ARTICLES

**Mail Stop Appeal Brief - Patents**

Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450

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 An Information Disclosure Statement (\_\_\_ pgs); copies of \_\_\_ applications; 1449 forms (\_\_\_ pgs); and copies of \_\_\_ documents cited on the 1449 forms.  
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 A certified copy of a \_\_\_ application, Serial No. \_\_\_, filed \_\_\_\_\_, the right of priority of which is claimed under 35 U.S.C. §119.  
 Other: Appeal Brief (12 pgs); Claims Appendix (18 pgs); Evidence Appendix (60 pgs); Cited Authorities and Documents (11 pgs); Related Appeals and Interferences Appendix (1 pg).  
 Amendment \_\_\_ No Additional fee is required. The fee has been calculated as shown:

Fee Calculation for Claims Pending After Amendment					
	Pending Claims after Amendment (1)	Claims Paid for Earlier (2)	Number of Additional Claims (1-2)	Cost per Additional Claim	Additional Fees Required
Total Claims				x \$50 =	
Independent Claims				x \$200 =	
One or More New Multiple Dependent Claims Presented? If Yes, Add \$360 Here →					
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By: Rachel Congdon-Geben  
 Name: Rachel Congdon-Geben

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PATENT  
Docket No. 49933US031

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant(s): HOOPMAN et al. ) Group Art Unit: 1722  
Serial No.: 09/520,032 ) Examiner: Joseph S. Del Sole  
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For: TOOLS TO MANUFACTURE ABRASIVE ARTICLES

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**APPEAL BRIEF**

**Mail Stop Appeal Brief - Patents**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This Brief is presented in support of the Notice of Appeal filed 3 August 2005, from the final rejection of claims 17, 20-21, 25-28, 33-54, 94, 95, and 98-111 of the above-identified application under 37 C.F.R. §§1.113 and 1.191.

This Brief is being submitted as set forth in 37 C.F.R. §41.37. Please charge Deposit Account No. 13-4895 the fee for filing this Brief under 37 C.F.R. §41.20(b)(2).

**I. REAL PARTY IN INTEREST**

The real party in interest of the above-identified patent application is the assignee, 3M Innovative Properties Company, as evidenced by the assignment recorded at Reel 010660, Frame 0401.

## **II. RELATED APPEALS AND INTERFERENCES**

The only appeals or interferences known to Appellant's Representatives that could directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal is an appeal to the Board of Patent Appeals and Interferences of co-pending U.S. Patent Application Serial No. 09/955,604 (the Notice of Appeal for this application also filed on August 3, 2005). As indicated in the attached Related Appeals and Interferences Appendix, Appellant's Representatives are aware of no decisions rendered by the Board in that appeal.

## **III. STATUS OF CLAIMS**

Claims 17, 19-21, 25-28, 33-54, 94-96, and 98-111 are pending in the present application and are the subject of this Appeal (see Claims Appendix).

Of these pending claims, claims 20, 21, 25-28, 33-54, 94-96, and 98-111 stand rejected as unpatentable over Pieper et al. (U.S. Patent No. 5,152,917) in view of Rochlis (U.S. Patent No. 3,312,583) and either of Larson (U.S. Patent No. 4,903,440) or Bloecker et al. (U.S. Patent No. 4,799,939).

In addition, claims 17, 20, 21, 25-28, 33-54, 94-96, and 98-111 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 23, 24, 30-32, 89, 90, 92, 93, and 133-148 of co-pending U.S. application serial no. 09/955,604.

The Examiner indicated that claim 19 is allowable. In addition, the Examiner indicated that only the Double Patenting rejection must be overcome in order for claim 17 to be allowable.

## **IV. STATUS OF AMENDMENTS**

No amendment after issuance of the Final Office Action under 37 C.F.R § 1.116 has been submitted in the present application.

## **V. SUMMARY OF CLAIMED SUBJECT MATTER**

Appellants' invention is directed to a production tool for manufacturing an abrasive article. The production tool includes a plurality of cavities, each of which has a single opening.

Various embodiments of the production tool are claimed. For example, the production tool may include a plurality of cavities, wherein the cavities each have dimensions defining the cavity (e.g., claims 25-27, 36-38, 40, 47-49, 94-96, 101-104, and 108-111), wherein the cavities each have a geometric shape (e.g., claims 28, 39, and 50). Alternatively, the production tool may include a first and second plurality of cavities, a first, second, and third plurality of cavities, or a first, second, third, and fourth plurality of cavities, wherein each plurality has a geometric shape and plurality of angles forming the geometric shape (e.g., a first geometric shape and a first plurality of angles forming the geometric shape and a second plurality of angles forming the geometric shape) (e.g., claims 33-35, 44-46, 98-100, and 105-107). In some of these embodiments, the angles are different in at least two of the cavities (e.g., claims 28 and 39) or one of the angles of one of the plurality is different from all of the angles of the other pluralities (e.g., at least one of the angles of the first plurality is different from all of the angles of the second and third plurality of angles) (e.g., claims 33-35 and 44-46). In some embodiments, at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair (e.g., claims 25, 36, 39, and 47); at least 30% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair (e.g., claims 26, 37, and 48); or at least 50% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair (e.g., claims 27, 38, and 49).

In some of the above embodiments, the production tool includes a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths (e.g., claims 94-96, 101-104, and 108-111). In some of these embodiments, at least 10% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair (e.g., claims 94, 101, and 108), at least 30% of pairs of adjacent cavities have

at least one base edge length different between the two cavities of the pair (e.g., claims 95, 102, and 109 ), or at least 50% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair (e.g., claims 96, 103, and 110). In some embodiments, at least two adjacent cavities have at least one base edge length different between the two cavities (e.g., claims 104 and 111).

In some embodiments, the production tool may include a first and second plurality of cavities, a first, second and third plurality of cavities, or a first, second, third, and fourth plurality of cavities, wherein each plurality of cavities each have a geometric shape including a base and a plurality of base edge lengths forming the base of the geometric shape, and at least one of the base edge lengths of one of the plurality of cavities is different from the base edge lengths of the other pluralities of cavities (e.g., the first plurality of cavities each have a first geometric shape including a base and a first plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second plurality) (e.g., claims 98-100 and 105-107).

In some embodiments, the production tool may include a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first shape and a second group of cavities has a second, different shape (e.g., claims 41 and 52), or wherein a first group of cavities has a first size and a second group of cavities has a second, different size.

In some embodiments, the production tool includes a plurality of cavities defined by substantially distinct and discernible boundaries which include substantially specific dimensions, wherein a first cavity has specific first dimensions and a second cavity has specific second dimensions, each of the cavities having a boundary defined by at least four planar surfaces, wherein adjacent planar surfaces of one cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first cavity is different from all of the angles of intersection of said second cavity (e.g., claims 17, 20, 21, 43, and 54). Some embodiments may further include cavities including pyramidal shapes, wherein each pyramidal

shape includes planar surfaces which intersect to form a material-included angle at a distal end of said pyramid, wherein said material-included angle is a value from 25° to 90° (e.g., claim 17).

The production tool may be a roll (e.g., claim 20), a coating roll (e.g., claims 21, 33-43, and 98-104), or an engraved metal roll (e.g., claims 44-54 and 105-111).

Support for the pending claims can be found throughout the specification, including the originally filed claims and drawings, as would be clearly understood by one of skill in the art.

Examples of locations of support for the pending claims are listed in the table below.

Claim 17	Support can be found, for example, in originally filed claim 17; and in originally filed Figures 6 and 7.
Claim 20	Support can be found, for example, in originally filed claim 20; and in originally filed Figures 6 and 7.
Claim 21	Support can be found, for example, in originally filed claim 21; and in originally filed Figures 6 and 7.
Claim 25	Support can be found, for example, at page 6, lines 18-25; at page 20, line 27 through page 21, line 18; at page 26, line 16 through page 27, line 7; and in originally filed Figures 6 and 7.
Claim 26	Support can be found, for example, at page 6, lines 18-25; at page 20, line 27 through page 21, line 18; at page 26, line 16 through page 27, line 7; and in originally filed Figures 6 and 7.
Claim 27	Support can be found, for example, at page 6, lines 18-25; at page 20, line 27 through page 21, line 18; at page 26, line 16 through page 27, line 7; and in originally filed Figures 6 and 7.
Claim 28	Support can be found, for example, at page 6, line 18 through page 7, line 15; at page 19, lines 14-20; at page 20, line 27 through page 21, line 18; at

	page 26, line 16 through page 27, line 7; and in originally filed Figures 6 and 7.
Claim 33-43	Support can be found, for example, at page 28, lines 12-17; above with respect to claims 22-32; and in originally filed Figures 6 and 7.
Claim 44-54	Support can be found, for example, at page 28, lines 12-17; above with respect to claims 22-32; and in originally filed Figures 6 and 7.
Claim 94	Support can be found, for example, at page 6, lines 18-25; at page 20, line 27 through page 21, line 18; at page 26, line 16 through page 27, line 7; at page 10, lines 23-27; and in originally filed Figures 6 and 7.
Claim 95	Support can be found, for example, at page 6, lines 18-25; at page 20, line 27 through page 21, line 18; at page 26, line 16 through page 27, line 7; at page 10, lines 23-27; and in originally filed Figures 6 and 7.
Claim 96	Support can be found, for example, at page 6, lines 18-25; at page 20, line 27 through page 21, line 18; at page 26, line 16 through page 27, line 7; at page 10, lines 23-27; and in originally filed Figures 6 and 7.
Claims 98-104	Support can be found, for example, at page 28, lines 12-17; above with respect to claims 91-97; and in originally filed Figures 6 and 7.
Claims 105-111	Support can be found, for example, at page 28, lines 12-17; above with respect to claims 91-97; and in originally filed Figures 6 and 7.

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

Claims 20, 21, 25-28, 33-54, 94-96, and 98-111 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Pieper et al. (U.S. Patent No. 5,152,917) in view of Rochlis (U.S. Patent No. 3,312,583) and either Larson (U.S. Patent No. 4,903,440) or Bloecker et al. (U.S. Patent No. 4,799,939).

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Claims 17, 20, 21, 25-28, 33-54, 94-96, and 98-111 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 23, 24, 30-32, 89, 90, 92, 93, and 133-148 of copending Application No. 09/955,604.

## **VII. ARGUMENT**

I. Claims 20, 21, 25-28, 33-54, 94-96, and 98-111 are not obvious under 35 U.S.C. 103(a) over Pieper et al. (U.S. Patent No. 5,152,917) in view of Rochlis (U.S. Patent No. 3,312,583) and either Larson (U.S. Patent No. 4,903,440) or Bloecker et al. (U.S. Patent No. 4,799,939).

To support a *prima facie* case of obviousness under 35 U.S.C. §103(a), three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves, the knowledge generally available to one of ordinary skill in the art, or the nature of the problem involved, to modify a reference or combine reference teachings. Second, there must be a reasonable expectation of success (i.e., a reasonable expectation that the benefit result will be achieved). And third, the prior art reference(s) must teach or suggest all the elements and limitations of the claims of the Application. MPEP §2143. Appellants, while not acquiescing to the merits of the Examiner's rejection herein, respectfully assert that the Examiner's obviousness rejection does not meet all the above criteria and, therefore, fails to set forth a *prima facie* case of obviousness.

### Claims 20, 21, 25-28, 33-54, 94-96, and 98-111

The proposed rejection is premised on the following asserted motivation to modify/combine the cited references: "It would have been obvious to one having ordinary skill in the art at the time of the Applicant's invention to have to have [sic] modified the abrasive article production tool (a pile-like product) of Pieper et al with the cavities of varied dimensions as taught by the production tool of Rochlis because it enables a production tool capable of

producing an abrasive article (pile like articles) with an almost indefinite number of specifically different physical characteristics, presenting many different visual, textural and other effects and it would have been obvious to desire cavities that produce such a varied collection of abrasive member sizes and shapes as taught by Larson and Bloecker because such variations achieve a high rate of cut and optimize cut rate, life of the abrasive article and surface finish on the workpiece as well as improve grinding performance." Final Office Action, page 6, lines 5-15 (mailed May 10, 2005).

Appellants respectfully submit that the asserted motivation to combine/modify the references does not meet the requirements for a *prima facie* case of obviousness. "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." MPEP § 2143.01, p. 2100-131, 8<sup>th</sup> Ed. (Rev. 2, May 2004) (*citing, In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)).

The inventions described in Pieper et al. were developed because the prior art abrasive articles "lack a high degree of consistency. If the abrasive article is made via a conventional process, the adhesive or binder system can flow before or during curing, thereby adversely affecting product consistency." Pieper et al., col. 1, lines 57-61. To address the problems of inconsistency, Pieper et al. describe abrasive articles and tools for making the abrasive articles that provide consistency or uniformity. "The more consistent an abrasive article of this invention, the more consistent will be the finish imparted by the abrasive article to the workpiece.

An abrasive article having an ordered profile has a high level of consistency, since the height of the peaks of the abrasive composites will normally not vary by more than 10%." *Id.* at col. 7, lines 63-68. In other words, Pieper et al. teaches that consistency and uniformity are the objectives in the abrasive articles (and, therefore, the tools used to manufacture them). This interpretation is strengthened by a review of the figures of Pieper et al., all of which depict consistent, uniform abrasive articles/tools (except for those depicting the prior art).

Against that focus on consistency and uniformity, it is asserted in the Final Office Action that one of ordinary skill in the art would "have modified the abrasive article production tool . . . of Pieper et al with cavities of varied dimensions as taught by the production tool of Rochlis." (Final Office Action, mailed May 10, 2005, page 6, lines 6-8). In other words, it is asserted that one of ordinary skill in the art would purposefully introduce variations contrary to the teachings of Pieper et al. that variations and non-uniformities are to be avoided. Applicants respectfully submit that such an asserted modification "would render the prior art invention being modified [Pieper et al.] unsatisfactory for its intended purpose." As a result, the asserted motivation is negated and a *prima facie* case of obviousness has not been established.

Larson and Bloecker also rely on modifications that would introduce variations or inconsistencies into the articles/tools of Pieper et al. Thus, in view of the above comments regarding lack of motivation to combine references wherein the combination would introduce inconsistencies to the composites of Pieper et al., Appellants contend that the Examiner's asserted motivation to combine Pieper et al. with either Larson or Bloecker is negated, and a *prima facie* case of obviousness has not been established.

For at least the above reasons, Appellants respectfully submit that the rejection of claims 20, 21, 25-28, 33-54, 94-96, and 98-111 over Pieper et al. in view of Rochlis, and further in view of either Larson or Bloecker does not meet the requirements for a *prima facie* case of obviousness.

**Claims 20, 21, 33-54, and 98-111**

Of the claims subject to this rejection, a subset, namely claims 20, 21, 33-54, and 98-111, recite a production tool in the form of a roll. Appellants submit that when applied to a production tool in the form of a roll, the assertions with respect to the teachings of Rochlis are not supported by the reference itself, thus providing another basis on which a *prima facie* case of

obviousness has not been established for at least claims 20, 21, 33-54, and 98-111.

It is asserted, for example, that the teachings of Figures 21 and 22 in Rochlis support many assertions made with respect to variations in cavity shapes. Applicants respectfully disagree.

Figures 21 and 22 of Rochlis disclose a tool with various geometrically shaped cavities. That tool, however, is in the form of a flat sheet, not a roll. To support the asserted rejection based, in part, on Rochlis, it is asserted that the variations in geometric shapes as seen in Figures 21 and 22 could be adapted to use in a roll. Rochlis, however, does not teach or suggest the use of differently shaped cavities in a roll. Rather, Rochlis teaches only that variations in cavities can be used in connection with flat, laminated tools.

While it is unlikely that the specifically different type of plate holes schematically shown in FIGS. 21 and 22 will be employed in any given mold, nevertheless, these views show the wide variation of molding cavity outlines which may be built into a laminated mold in which the cavity formations extend from side-to-side of the constituent [sic] laminae rather than from edges thereof.

Rochlis, col. 13, lines 29-35.

As a result, any assertion that Rochlis provides support for geometric shape variations in rolls is not supported by the reference and cannot form the basis for a *prima facie* case of obviousness with respect to claims 20, 21, 33-54, and 98-111.

For at least the above reasons, Appellants respectfully submit that the rejection of claims 20, 21, 33-54, and 98-111 over Pieper et al. in view of Rochlis, and further in view of either Larson or Bloecher does not meet the requirements for a *prima facie* case of obviousness.

II. Claims 17, 20, 21, 25-28, 33-54, 94-96, and 98-111 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 23, 24, 30-32, 89, 90, 92, 93, and 133-148 of copending Application No. 09/955,604.

**Appeal Brief**

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This is a provisional rejection over claims in an application currently under appeal. As indicated in the Response filed in the present application on March 30, 2005, upon an indication of otherwise allowable subject matter and in the event this rejection is maintained, Appellants will provide an appropriate response to this provisional rejection.

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### **VIII. SUMMARY**

For at least the reasons presented herein above, Appellant respectfully requests that the Board review and reverse the rejection of claims 17, 20-21, 25-28, 33-54, 94-96, and 98-111 as discussed herein, and that notification of the allowance of these claims be issued.

Respectfully submitted for,

HOOPMAN et al.

By  
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03 October 2005

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By: Rachele Vongliani-Graham  
Name: Rachele Vongliani-Graham

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**CLAIMS APPENDIX**  
**Serial No.: 09/520,032**  
**Docket No.: 49933US031**

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1.-16. (Canceled)

17. (Previously Presented) A production tool for manufacturing an abrasive article that comprises a major surface having deployed in fixed position thereon first and second three-dimensional abrasive composites, each of said composites comprising abrasive particles dispersed in a binder and having a shape defined by a substantially distinct and discernible boundary which includes substantially specific dimensions, wherein said first abrasive composite has a shape having specific first dimensions and said second abrasive composite has a second shape having second specific dimensions, wherein each of said abrasive composites has a boundary defined by at least four planar surfaces, wherein adjacent planar surfaces of one composite meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first abrasive composite is different from all of the angles of intersection of said second composite, said production tool comprising a structure having a plurality of adjacent three-dimensional cavities formed on a major surface thereof, wherein each three-dimensional cavity is defined by a substantially distinct and discernible boundary which includes substantially specific dimensions, wherein a first three-dimensional cavity has a first shape having specific first dimensions and a second three-dimensional cavity has a second shape having second specific dimensions, wherein each of said three-dimensional cavities has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one three-dimensional cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first three-dimensional cavity is different from all angles of intersection of said second three-dimensional cavity, wherein said three-dimensional cavities comprise pyramidal shapes, wherein each pyramidal shape comprises planar surfaces which intersect to form a material-included angle at a distal end of said pyramid, wherein said material-included angle is a value from 25° to 90°, and wherein each of the cavities has a single opening.

18. (Canceled)

19. (Previously Presented) A production tool useful to shape an abrasive slurry into an array of three-dimensional nonidentical abrasive composites, said production tool manufactured by a method comprising:

(A) preparing a master tool, the method comprising:

(1) determining angles corresponding to facing right and left planar surfaces of adjacent three-dimensional shapes and wherein each of said angles has a value as measured between its planar surface and a plane which extends in a normal direction to said major surface and contains an edge of said planar surface in contact with said major surface, by the following substeps:

(i) selecting an angle value between, but not including, 0° and 90° to establish a first right half angle of a first right planar surface of a first right-side three-dimensional shape with a random number generating means capable of randomly selecting an angle value between, but not including, 0° and 90°;

(ii) selecting an angle value between, but not including, 0° and 90° with said random number generating means to establish a first left half angle for a first left planar surface of a first left-side three-dimensional shape facing said first right planar surface of said first right-side three-dimensional shape;

(iii) proceeding along a first direction extending linearly within said first imaginary plane to a second left planar surface of a second left-side three-dimensional shape located adjacent said first left-side three-dimensional shape and using said random number generating means to select a value between, but not including, 0° and 90° to establish a second left planar angle for said second left planar surface;

(iv) using said random number generating means to select a value between, but not including, 0° and 90° for a second right planar surface of a second right-side three-dimensional shape facing said second left planar surface;

(v) proceeding along said first direction to a third right-side three-dimensional shape located adjacent said second right-side three-dimensional shape;

(vi) repeating said substeps (i), (ii), (iii), (iv), and (v), in that sequence, at least once;

(2) repeating step (1) except that the angles are determined for left and right planar surfaces of adjacent three-dimensional shapes deployed in two adjacent rows in a second direction extending linearly within said first imaginary plane, wherein said first and second directions intersect;

(3) using means to determine, for a given width of said surface of said master tool, locations of grooves required to be cut by a cutting means to form a series of intersecting grooves defining a plurality of three-dimensional shapes having said angles calculated by steps (1) and (2); and

(4) providing a cutting means to cut grooves in said surface of said master tool in correspondence to said angles calculated by steps (1) and (2) and said groove locations determined by step (3) to form a series of intersecting grooves which define a plurality of three-dimensional shapes upraised from said surface, each of said shapes being defined by a distinct and discernible boundary including specific dimensions, wherein not all said three-dimensional shapes are identical; and

(B) forming the production tool using the master tool.

20. (Previously Presented) A production tool for manufacturing an abrasive article that comprises a major surface having deployed in fixed position thereon first and second three-dimensional abrasive composites, each of said composites comprising abrasive particles dispersed in a binder and having a shape defined by a substantially distinct and discernible boundary which includes substantially specific dimensions, wherein said first abrasive composite has a shape having specific first dimensions and said second abrasive composite has a second shape having second specific dimensions, wherein each of said abrasive composites has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one composite meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first abrasive

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composite is different from all of the angles of intersection of said second composite, said production tool comprising a structure having a plurality of adjacent three-dimensional cavities formed on a major surface thereof, wherein each three-dimensional cavity is defined by a substantially distinct and discernible boundary which includes substantially specific dimensions, wherein a first three-dimensional cavity has a first shape having specific first dimensions and a second three-dimensional cavity has a second shape having second specific dimensions, wherein each of said three-dimensional cavities has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one three-dimensional cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first three-dimensional cavity is different from all angles of intersection of said second three-dimensional cavity, wherein the production tool is a roll, and wherein each of the cavities has a single opening.

21. (Previously Presented) A production tool for manufacturing an abrasive article that comprises a major surface having deployed in fixed position thereon first and second three-dimensional abrasive composites, each of said composites comprising abrasive particles dispersed in a binder and having a shape defined by a substantially distinct and discernible boundary which includes substantially specific dimensions, wherein said first abrasive composite has a shape having specific first dimensions and said second abrasive composite has a second shape having second specific dimensions, wherein each of said abrasive composites has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one composite meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first abrasive composite is different from all of the angles of intersection of said second composite, said production tool comprising a structure having a plurality of adjacent three-dimensional cavities formed on a major surface thereof, wherein each three-dimensional cavity is defined by a substantially distinct and discernible boundary which includes substantially specific dimensions, wherein a first three-dimensional cavity has a first shape having specific first dimensions and a second three-dimensional

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cavity has a second shape having second specific dimensions, wherein each of said three-dimensional cavities has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one three-dimensional cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first three-dimensional cavity is different from all angles of intersection of said second three-dimensional cavity, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

22.-24. (Canceled)

25. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, and wherein each of the cavities has a single opening.

26. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 30% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, and wherein each of the cavities has a single opening.

27. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 50% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, and wherein each of the cavities has a single opening.

28. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have a geometric shape,

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dimensions defining the cavity, and angles forming the geometric shape, wherein the angles are different in at least two of the cavities, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, and wherein each of the cavities has a single opening.

29.-32. (Canceled)

33. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape and the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second plurality of angles, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

34. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, and the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second and third plurality of angles, wherein at least one of the angles of the second plurality is different from all of the angles of the first and third plurality of angles, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

35. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape and fourth plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second, third, and fourth plurality of angles, wherein at least one of the angles of the second plurality is different from all of the angles of the first, third, and fourth plurality of angles, wherein at least one of the angles of the third plurality is different from all of the angles of the first, second, and fourth plurality of angles, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

36. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

37. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 30% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

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38. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 50% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.
39. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have a geometric shape, dimensions defining the cavity, and angles forming the geometric shape, wherein the angles are different in at least two of the cavities, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.
40. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least two adjacent cavities have at least one dimension different between the two cavities, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.
41. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first shape and a second group of cavities has a second, different, shape, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.
42. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first

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group of cavities has a first size and a second group of cavities has a second, different size, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

43. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defined by substantially distinct and discernible boundaries which include substantially specific dimensions, wherein a first cavity has specific first dimensions and a second cavity has specific second dimensions, each of said cavities has a boundary defined by at least four planar surfaces wherein adjacent planar surfaces of one cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first cavity is different from all the angles of intersection of said second cavity, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.
44. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape and the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second plurality of angles, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.
45. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, and the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality

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is different from all of the angles of the second and third plurality of angles, wherein at least one of the angles of the second plurality is different from all of the angles of the first and third plurality of angles, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

46. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape and first plurality of angles forming the geometric shape, the second plurality of cavities each have a second geometric shape and second plurality of angles forming the geometric shape, the third plurality of cavities each have a third geometric shape and third plurality of angles forming the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape and fourth plurality of angles forming the geometric shape, wherein at least one of the angles of the first plurality is different from all of the angles of the second, third, and fourth plurality of angles, wherein at least one of the angles of the second plurality is different from all of the angles of the first, third, and fourth plurality of angles, wherein at least one of the angles of the third plurality is different from all of the angles of the first, second, and fourth plurality of angles, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

47. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

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48. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 30% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

49. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least 50% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

50. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have a geometric shape, dimensions defining the cavity, and angles forming the geometric shape, wherein the angles are different in at least two of the cavities, wherein at least 10% of pairs of adjacent cavities have at least one dimension different between the two cavities of the pair, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

51. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, wherein at least two adjacent cavities have at least one dimension different between the two cavities, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

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52. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first shape and a second group of cavities has a second, different, shape, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.
53. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defining at least a first and a second group, wherein a first group of cavities has a first size and a second group of cavities has a second, different, size, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.
54. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities defined by substantially distinct and discernible boundaries which include substantially specific dimensions, wherein a first cavity has specific first dimensions and a second cavity has specific second dimensions, wherein each of said cavities has a boundary defined by at least four planar surfaces, wherein adjacent planar surfaces of one cavity meet at an edge to define an angle of intersection therebetween, wherein at least one angle of intersection of said first cavity is different from all the angles of intersection of said second cavity, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.
- 55.-93. (Canceled)

94. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 10% of pairs of adjacent cavities

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have at least one base edge length different between the two cavities of the pair, and wherein each of the cavities has a single opening.

95. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 30% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, and wherein each of the cavities has a single opening.

96. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 50% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, and wherein each of the cavities has a single opening.

97. (Canceled)

98. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape and the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second plurality of base edge lengths, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

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99. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, and the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second and third plurality of base edge lengths, wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first and third plurality of base edge lengths, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

100. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape including a base and fourth plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second, third, and fourth plurality of base edge lengths, wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first, third, and fourth plurality of base edge lengths, wherein at least one of the base edge lengths of the third plurality is different from all of the base edge lengths of the first, second, and fourth plurality of base edge lengths, and wherein at least one of the base edge lengths of the fourth plurality is different from all of the base edge lengths of the first, second, and third plurality of base edge lengths.

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edge lengths of the first, second, and fourth plurality of base edge lengths, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

101. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 10% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

102. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 30% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

103. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 50% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

104. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least two adjacent cavities have at least one base edge length different between the two cavities, wherein the production tool is a coating roll, and wherein each of the cavities has a single opening.

105. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first and second plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape and the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second plurality of base edge lengths, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

106. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, and third plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, and the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second and third plurality of base edge lengths, wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first and third plurality of base edge lengths, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

107. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a first, second, third, and fourth plurality of cavities, wherein the first plurality of cavities each have a first geometric shape including a base and first plurality of base edge lengths

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forming the base of the geometric shape, the second plurality of cavities each have a second geometric shape including a base and second plurality of base edge lengths forming the base of the geometric shape, the third plurality of cavities each have a third geometric shape including a base and third plurality of base edge lengths forming the base of the geometric shape, and the fourth plurality of cavities each have a fourth geometric shape including a base and fourth plurality of base edge lengths forming the base of the geometric shape, wherein at least one of the base edge lengths of the first plurality is different from all of the base edge lengths of the second, third, and fourth plurality of base edge lengths, wherein at least one of the base edge lengths of the second plurality is different from all of the base edge lengths of the first, third, and fourth plurality of base edge lengths, wherein at least one of the base edge lengths of the third plurality is different from all of the base edge lengths of the first, second, and fourth plurality of base edge lengths, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

108. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 10% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

109. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 30% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

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110. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least 50% of pairs of adjacent cavities have at least one base edge length different between the two cavities of the pair, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

111. (Previously Presented) A production tool suitable for use in manufacturing an abrasive article comprising a plurality of cavities, wherein the cavities each have dimensions defining the cavity, the dimensions including base edge lengths, wherein at least two adjacent cavities have at least one base edge length different between the two cavities, wherein the production tool is an engraved metal roll, and wherein each of the cavities has a single opening.

112.-175. (Canceled)



EVIDENCE APPENDIX  
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1. Pieper et al. (U.S. Patent No. 5,152,917)
2. Rochlis (U.S. Patent No. 3,312,583)
3. Larson (U.S. Patent No. 4,903,440)
4. Bloecker et al. (U.S. Patent No. 4,799,939)



## CITED AUTHORITIES AND DOCUMENTS

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1. M.P.E.P. §2143.
2. M.P.E.P. §2143.01.
3. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

§ 2144.09 for examples of reasoning supporting obviousness rejections.

When the motivation to combine the teachings of the references is not immediately apparent, it is the duty of the examiner to explain why the combination of the teachings is proper. *Ex parte Skinner*, 2 USPQ2d 1788 (Bd. Pat. App. & Inter. 1986). A statement of a rejection that includes a large number of rejections must explain with reasonable specificity at least one rejection, otherwise the examiner procedurally fails to establish a *prima facie* case of obviousness. *Ex parte Blanc*, 13 USPQ2d 1383 (Bd. Pat. App. & Inter. 1989) (Rejection based on nine references which included at least 40 prior art rejections without explaining any one rejection with reasonable specificity was reversed as procedurally failing to establish a *prima facie* case of obviousness.).

If the examiner determines there is factual support for rejecting the claimed invention under 35 U.S.C. 103, the examiner must then consider any evidence supporting the patentability of the claimed invention, such as any evidence in the specification or any other evidence submitted by the applicant. The ultimate determination of patentability is based on the entire record, by a preponderance of evidence, with due consideration to the persuasiveness of any arguments and any secondary evidence. *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). The legal standard of “a preponderance of evidence” requires the evidence to be more convincing than the evidence which is offered in opposition to it. With regard to rejections under 35 U.S.C. 103, the examiner must provide evidence which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a *prima facie* case of obviousness) is more probable than not.

When an applicant submits evidence, whether in the specification as originally filed or in reply to a rejection, the examiner must reconsider the patentability of the claimed invention. The decision on patentability must be made based upon consideration of all the evidence, including the evidence submitted by the examiner and the evidence submitted by the applicant. A decision to make or maintain a rejection in the face of all the evidence must show that it was based on the totality of the evidence. Facts established by rebuttal evidence must be evaluated along with the facts on which the conclusion of obviousness was

reached, not against the conclusion itself. *In re Eli Lilly & Co.*, 902 F.2d 943, 14 USPQ2d 1741 (Fed. Cir. 1990).

See *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984) for a discussion of the proper roles of the examiner’s *prima facie* case and applicant’s rebuttal evidence in the final determination of obviousness. See MPEP § 706.02(j) for a discussion of the proper contents of a rejection under 35 U.S.C. 103.

## 2143 Basic Requirements of a *Prima Facie* Case of Obviousness

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

### 2143.01 Suggestion or Motivation To Modify the References [R-2]

#### THE PRIOR ART MUST SUGGEST THE DESIRABILITY OF THE CLAIMED INVENTION

“There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art.” *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998) (The combination of the references taught every element of the claimed invention, however without a motivation to combine, a rejection based on a *prima facie* case of obvious was held improper.). The level of skill in the art cannot be relied upon to provide the suggestion to combine references. *Al-Site Corp. v. VSI Int’l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999).

§ 2144.09 for examples of reasoning supporting obviousness rejections.

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“There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art.” *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998) (The combination of the references taught every element of the claimed invention, however without a motivation to combine, a rejection based on a *prima facie* case of obvious was held improper.). The level of skill in the art cannot be relied upon to provide the suggestion to combine references. *Al-Site Corp. v. VSI Int’l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999).

"In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination, or other modification." *In re Linter*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

>*In Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 69 USPQ2d 1686 (Fed. Cir. 2004), the patent claimed underpinning a slumping building foundation using a screw anchor attached to the foundation by a metal bracket. One prior art reference taught a screw anchor with a concrete bracket, and a second prior art reference disclosed a pier anchor with a metal bracket. The court found motivation to combine the references to arrive at the claimed invention in the "nature of the problem to be solved" because each reference was directed "to precisely the same problem of underpinning slumping foundations." *Id.* at 1276, 69 USPQ2d at 1690. The court also rejected the notion that "an express written motivation to combine must appear in prior art references...." *Id.* at 1276, 69 USPQ2d at 1690.<

In *In re Kotzab*, the claims were drawn to an injection molding method using a single temperature sensor to control a plurality of flow control valves. The primary reference disclosed a multizone device having multiple sensors, each of which controlled an

associated flow control valve, and also taught that one system may be used to control a number of valves. The court found that there was insufficient evidence to show that one system was the same as one sensor. While the control of multiple valves by a single sensor rather than by multiple sensors was a "technologically simple concept," there was no finding "as to the specific understanding or principle within the knowledge of the skilled artisan" that would have provided the motivation to use a single sensor as the system to control more than one valve. 217 F.3d at 1371, 55 USPQ2d at 1318.

In *In re Fine*, the claims were directed to a system for detecting and measuring minute quantities on nitrogen compounds comprising a gas chromatograph, a converter which converts nitrogen compounds into nitric oxide by combustion, and a nitric oxide detector. The primary reference disclosed a system for monitoring sulfur compounds comprising a chromatograph, combustion means, and a detector, and the secondary reference taught nitric oxide detectors. The examiner and Board asserted that it would have been within the skill of the art to substitute one type of detector for another in the system of the primary reference, however the court found there was no support or explanation of this conclusion and reversed.

In *In re Jones*, the claimed invention was the 2-(2-*ø*-aminoethoxy) ethanol salt of dicamba, a compound with herbicidal activity. The primary reference disclosed *inter alia* the substituted ammonium salts of dicamba as herbicides, however the reference did not specifically teach the claimed salt. Secondary references teaching the amine portion of the salt were directed to shampoo additives and a byproduct of the production of morpholine. The court found there was no suggestion to combine these references to arrive at the claimed invention.

#### **WHERE THE TEACHINGS OF THE PRIOR ART CONFLICT, THE EXAMINER MUST WEIGH THE SUGGESTIVE POWER OF EACH REFERENCE**

The test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art, and all teachings in the prior art must be considered to the extent that they are in analogous arts. Where the teachings of two or more

prior art references conflict, the examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another. *In re Young*, 927 F.2d 588, 18 USPQ2d 1089 (Fed. Cir. 1991) (Prior art patent to Carlisle disclosed controlling and minimizing bubble oscillation for chemical explosives used in marine seismic exploration by spacing seismic sources close enough to allow the bubbles to intersect before reaching their maximum radius so the secondary pressure pulse was reduced. An article published several years later by Knudsen opined that the Carlisle technique does not yield appreciable improvement in bubble oscillation suppression. However, the article did not test the Carlisle technique under comparable conditions because Knudsen did not use Carlisle's spacing or seismic source. Furthermore, where the Knudsen model most closely approximated the patent technique there was a 30% reduction of the secondary pressure pulse. On these facts, the court found that the Knudsen article would not have deterred one of ordinary skill in the art from using the Carlisle patent teachings.).

#### **FACT THAT REFERENCES CAN BE COMBINED OR MODIFIED IS NOT SUFFICIENT TO ESTABLISH PRIMA FACIE OBVIOUSNESS**

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990) (Claims were directed to an apparatus for producing an aerated cementitious composition by drawing air into the cementitious composition by driving the output pump at a capacity greater than the feed rate. The prior art reference taught that the feed means can be run at a variable speed, however the court found that this does not require that the output pump be run at the claimed speed so that air is drawn into the mixing chamber and is entrained in the ingredients during operation. Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." 916 F.2d at 682, 16 USPQ2d at 1432.). See also *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) (flexible landscape edging device which is conformable to a ground surface of

varying slope not suggested by combination of prior art references).

#### **FACT THAT THE CLAIMED INVENTION IS WITHIN THE CAPABILITIES OF ONE OF ORDINARY SKILL IN THE ART IS NOT SUFFICIENT BY ITSELF TO ESTABLISH PRIMA FACIE OBVIOUSNESS**

A statement that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000) (Court reversed obviousness rejection involving technologically simple concept because there was no finding as to the principle or specific understanding within the knowledge of a skilled artisan that would have motivated the skilled artisan to make the claimed invention); *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999) (The level of skill in the art cannot be relied upon to provide the suggestion to combine references.).

#### **THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE**

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) (Claimed device was a blood filter assembly for use during medical procedures wherein both the inlet and outlet for the blood were located at the bottom end of the filter assembly, and wherein a gas vent was present at the top of the filter assembly. The prior art reference taught a liquid strainer for removing dirt and water from gasoline and other light oils wherein the inlet and outlet were at the top of the device, and wherein a pet-cock (stopcock) was located at the bottom of the device for periodically removing the

collected dirt and water. The reference further taught that the separation is assisted by gravity. The Board concluded the claims were *prima facie* obvious, reasoning that it would have been obvious to turn the reference device upside down. The court reversed, finding that if the prior art device was turned upside down it would be inoperable for its intended purpose because the gasoline to be filtered would be trapped at the top, the water and heavier oils sought to be separated would flow out of the outlet instead of the purified gasoline, and the screen would become clogged.).

"Although statements limiting the function or capability of a prior art device require fair consideration, simplicity of the prior art is rarely a characteristic that weighs against obviousness of a more complicated device with added function." *In re Dance*, 160 F.3d 1339, 1344, 48 USPQ2d 1635, 1638 (Fed. Cir. 1998) (Court held that claimed catheter for removing obstruction in blood vessels would have been obvious in view of a first reference which taught all of the claimed elements except for a "means for recovering fluid and debris" in combination with a second reference describing a catheter including that means. The court agreed that the first reference, which stressed simplicity of structure and taught emulsification of the debris, did not teach away from the addition of a channel for the recovery of the debris.).

#### THE PROPOSED MODIFICATION CANNOT CHANGE THE PRINCIPLE OF OPERATION OF A REFERENCE

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959) (Claims were directed to an oil seal comprising a bore engaging portion with outwardly biased resilient spring fingers inserted in a resilient sealing member. The primary reference relied upon in a rejection based on a combination of references disclosed an oil seal wherein the bore engaging portion was reinforced by a cylindrical sheet metal casing. Patentee taught the device required rigidity for operation, whereas the claimed invention required resiliency. The court reversed the rejection holding

the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate." 270 F.2d at 813, 123 USPQ at 352.).

#### 2143.02 Reasonable Expectation of Success Is Required

##### OBVIOUSNESS REQUIRES ONLY A REASONABLE EXPECTATION OF SUCCESS

The prior art can be modified or combined to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986) (Claims directed to a method of treating depression with amitriptyline (or nontoxic salts thereof) were rejected as *prima facie* obvious over prior art disclosures that amitriptyline is a compound known to possess psychotropic properties and that imipramine is a structurally similar psychotropic compound known to possess antidepressive properties, in view of prior art suggesting the aforementioned compounds would be expected to have similar activity because the structural difference between the compounds involves a known bioisosteric replacement and because a research paper comparing the pharmacological properties of these two compounds suggested clinical testing of amitriptyline as an antidepressant. The court sustained the rejection, finding that the teachings of the prior art provide a sufficient basis for a reasonable expectation of success.); *Ex parte Blanc*, 13 USPQ2d 1383 (Bd. Pat. App. & Inter. 1989) (Claims were directed to a process of sterilizing a polyolefinic composition with high-energy radiation in the presence of a phenolic polyester antioxidant to inhibit discoloration or degradation of the polyolefin. Appellant argued that it is unpredictable whether a particular antioxidant will solve the problem of discoloration or degradation. However, the Board found that because the prior art taught that appellant's preferred antioxidant is very efficient and provides better results compared with other prior art antioxidants, there would have been a reasonable expectation of success.).

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733 F.2d 900, \*; 1984 U.S. App. LEXIS 15015, \*\*;  
221 U.S.P.Q. (BNA) 1125

IN RE LUCAS S. GORDON and KARL M. SUTHERLAND

Appeal No. 83-1281

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

733 F.2d 900; 1984 U.S. App. LEXIS 15015; 221 U.S.P.Q. (BNA) 1125

May 10, 1984

**PRIOR HISTORY: [\*\*1]**

Appealed from: United States Patent and Trademark Office Board of Appeals. Serial No. 124,312.

**DISPOSITION:** REVERSED.

**CASE SUMMARY**

**PROCEDURAL POSTURE:** Appellants challenged a decision by the United States Patent and Trademark Office Board of Appeals that affirmed the examiner's rejection of appellants' claim for a blood filter assembly as unpatentable for obviousness under 35 U.S.C.S. § 103.

**OVERVIEW:** The court reversed a decision that appellants' claim for a blood filter assembly was unpatentable for obviousness under 35 U.S.C.S. § 103. The prior art upon which the obviousness determination was based was a liquid strainer for removing dirt and water from gasoline and other light oils. The conclusion of *prima facie* obviousness was error because it was based on a modification of the prior art apparatus created by viewing it from one direction and the claimed apparatus from another direction. However, such a modification would have rendered the prior art apparatus inoperable and would not have been obvious to a person of ordinary skill in the art. In addition, the fact that the prior art could have been modified did not make the modification obvious unless the prior art suggested the desirability of the modification. Therefore, the rejection of appellants' claim based on obviousness was reversed.

**OUTCOME:** The court reversed a decision rejecting appellants' patent claims for a blood filter assembly based on obviousness, because a modification of a prior art apparatus would not have been obvious to a person of ordinary skill in the art and the prior art did not suggest the desirability of the modification.

**CORE TERMS:** blood, filter, apparatus, bottom, inlet, shell, assembly, outlet, water, dirt, top, liquid, medium, upside down, region, pocket, strainer, gasoline, oils, gas vent, incoming, pet-cock, screen, inner, *prima facie* case, unpatentable, modification, obviousness, teaches, *prima facie*

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Patent Law > Nonobviousness > Elements & Tests > Prior Art 

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[Patent Law](#) > [Claims & Specifications](#) > [Enablement Requirement](#) > [General Overview](#)

**HN1** For purposes of obviousness, the question is not whether a patentable distinction is created by viewing a prior art apparatus from one direction and a claimed apparatus from another, but, rather, whether it would have been obvious from a fair reading of the prior art reference as a whole to turn the prior art apparatus upside down. [More Like This Headnote](#) | [Shepardize](#): Restrict By Headnote

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**HN2** The mere fact a prior art reference could have been modified does not make the modification obvious unless the prior art suggested the desirability of the modification. [More Like This Headnote](#) | [Shepardize](#): Restrict By Headnote

**COUNSEL:** James W. Geriak, of Los Angeles, California, argued, for Appellants. With him on the brief was Bradford J. Duft.

John F. Pitrelli, of Arlington, Virginia, argued, for Appellee. With him on the brief were Joseph F. Nakamura, Solicitor and John W. Dewhirst, Associate Solicitor.

**JUDGES:** Bennett, Circuit Judge, Skelton, Senior Circuit Judge, and Miller, Circuit Judge.

**OPINIONBY:** MILLER

**OPINION:** [\*900] MILLER, Circuit Judge.

This appeal is from the decision of the United States Patent and Trademark Office ("PTO") Board of Appeals ("board") affirming the examiner's rejection of appellants' claims n1 1-3 and 5-7 as unpatentable under 35 U.S.C. § 103. We reverse.

- - - - - Footnotes - - - - -

n1 In application Serial No. 124,312, filed February 25, 1980, for a "Blood Filter."

- - - - - End Footnotes- - - - -

#### THE INVENTION

Appellants claim a "blood filter assembly" used during surgery and other medical procedures involving the handling of blood to remove clots, bone debris, [\*\*2] tissue, or other foreign materials from blood before it is returned to a patient's body. Unlike blood filter assemblies widely used in the prior art, the device of the present invention permits both entry of the blood into, and ultimate discharge of the blood out of, the *bottom* end of the filter assembly, as shown below. n2

- - - - - Footnotes - - - - -

n2 Extraneous numbers have been removed from this and the subsequent drawing for clarification.

- - - - - End Footnotes- - - - -

**[\*901] [SEE FIG. 1 IN ORIGINAL]**

The blood filter assembly comprises a shell 1 provided with blood inlet 3 and blood outlet 4. Between the blood inlet and the blood outlet is filter medium 6 positioned within the filter medium core 7.

The location of blood inlet 3 is such that the incoming blood is directed along a spirally upward path by the inner wall of the shell. Further, the location of the blood inlet at the bottom end of the filter assembly facilitates the removal of gas bubbles by allowing them to rise upwardly out of the blood. The gas bubbles so removed are released **[\*\*3]** from the blood filter assembly by means of a gas vent 5 located in the region of the top end of the assembly.

Independent claim 1, from which the other appealed claims depend, is illustrative:

Blood filter assembly comprising:

- a. a shell having a first top end and a second bottom end,
- b. a blood inlet located in the region of said bottom end and opening into said bottom end,
- c. a blood outlet located in the region of said bottom end,
- d. a gas vent located in the region of said top end, and
- e. a blood filter medium located between said blood inlet and said blood outlet, said blood inlet being located and configured in a manner capable of directing incoming blood in a generally spiral path within said shell.

Claims 2, 3, and 5-7 further define the shape of the shell, the shape of the filter medium, and the nature of the material used as the filter medium.

PRIOR ART

The sole reference relied upon by the board is United States Patent No. 1,175,948, issued March 21, 1916, to French. French discloses a liquid strainer for removing dirt and water from gasoline and other light oils. As shown below, the inlet 4 and outlet 5 of the French device are both **[\*\*4]** at the *top* end of the device.

[SEE ILLUSTRATION IN ORIGINAL]

**[\*902]** A continuous helical tooth or thread 8 is formed integral with the inner wall of shell 1 and imparts to the incoming liquid a whirling motion, which gives the liquid a scouring action to help clean the surface of a metal screen filter 21 and guides unwanted dirt and water downwardly into a pocket 9 in the bottom of the shell. A pair of shelves 10 and 11, projecting inwardly and downwardly from the inner wall of the shell, further assists the entrance of dirt and water into the pocket 9 and prevents their being drawn back into the main chamber 12. The reference expressly states, "gravity assists in the separation of

heavier oils or water." A pet-cock 13, projecting vertically downward from the bottom of the pocket is used to remove the collected dirt and water periodically. The top of the liquid strainer is completely closed by gland 3 except for the inlet and outlet openings.

#### BOARD OPINION

The board held that the appealed claims were drawn to an apparatus which "would have at least been rendered *prima facie* obvious to one of ordinary skill in the art by the apparatus disclosed in French." [\*\*5] The board's reasoning was that it would have been obvious to turn the French device upside down to have both the inlet and outlet at the bottom, rather than at the top; and to employ French's "pet-cock" as the claimed "gas vent." In the board's opinion, no patentable distinction was created by viewing French's apparatus from one direction and the claimed apparatus from another.

#### ANALYSIS

We are persuaded that the board erred in its conclusion of *prima facie* HN1~~to~~obviousness. The question is not whether a patentable distinction is created by viewing a prior art apparatus from one direction and a claimed apparatus from another, but, rather, whether it would have been obvious from a fair reading of the prior art reference as a whole to turn the prior art apparatus upside down. French teaches a liquid strainer which relies, at least in part, upon the assistance of gravity to separate undesired dirt and water from gasoline and other light oils. Therefore, it is not seen that French would have provided any motivation to one of ordinary skill in the art to employ the French apparatus in an upside down orientation. HN2~~to~~The mere fact that the prior art could be so modified would not have made [\*\*6] the modification obvious unless the prior art suggested the desirability of the modification. See *Carl Schenck, A. G. v. Nortron Corp.*, 713 F.2d 782, 787, 218 U.S.P.Q. (BNA) 698, 702 (Fed. Cir. 1983), and *In re Sernaker*, 702 F.2d 989, 995-96, 217 U.S.P.Q. (BNA) 1, 6-7 (Fed. Cir. 1983), both citing *In re Imperato*, 486 F.2d 585, 587, 179 U.S.P.Q. (BNA) 730, 732 (CCPA 1973).

Indeed, if the French apparatus were turned upside down, it would be rendered inoperable for its intended purpose. The gasoline to be filtered would be trapped in pocket 9, and the water French seeks to separate would flow freely out of the outlet 5. Further, unwanted dirt would build up in the space between the wall of shell 1 and screen 21, so that, in time, screen 21 would become clogged unless a drain valve, such as pet-cock 13, were reintroduced at the new "bottom" of the apparatus. See *In re Schulpen*, 55 C.C.P.A. 960, 390 F.2d 1009, 1013, 157 U.S.P.Q. (BNA) 52, 55 (CCPA 1968). In effect, French teaches away from the board's proposed modification.

Because the PTO has failed to establish a *prima facie* case of obviousness, the rejection of claims 1-3 and 5-7 as unpatentable under 35 [\*\*7] U.S.C. § 103 must be reversed. n3

- - - - - Footnotes - - - - -

n3 Because our holding that the PTO has failed to establish a *prima facie* case is dispositive, it is unnecessary to reach other arguments raised by appellants.

- - - - - End Footnotes- - - - -

REVERSED.

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## RELATED APPEALS AND INTERFERENCES APPENDIX

Serial No.: 09/520,032

Docket No.: 49933US031

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1. Appeal to the Board of Patent Appeals and Interferences for U.S. Patent Application Serial No. 09/955,604. Appellants are aware of no decisions rendered by the Board in connection with this appeal.